

**Claims**

5        1. Polarization mode dispersion controller device for controlling the state of polarization of an optical light wave, in particular in a terabit optical network, comprising a dispersion compensation unit and an adaptation control unit, wherein the dispersion compensation unit is fed with an incoming optical light wave, wherein the dispersion compensation unit  
10      comprises a multitude of compensation stages processing the optical light wave, wherein the dispersion compensation unit provides an equalized optical light wave, and wherein the adaptation control unit controls the dispersion compensation unit,

15      wherein

that at least one feed-forward signal tap is provided tapping the optical light wave inserted into one of the compensation stages,  
that the feed-forward signal(s) tapped by the feed-forward signal tap(s)  
20      is(are) fed into a distortion analyzer unit,  
and that the distortion analyzer unit provides the adaptation control unit with information about the incoming optical light wave for setting the dispersion compensation unit.

- 25      2. PMD controller device according to claim 1, wherein only one feed-forward signal tap is provided tapping the incoming optical light wave inserted into the first compensation stage.
- 30      3. PMD controller device according to claim 1, wherein a multitude of feed-forward signal taps is provided tapping the optical light wave as inserted

at different compensation stages each.

4. PMD controller device according to claim 1, wherein the distortion analyzer unit determines the state of polarization of the incoming optical light wave as a function of the frequency of the incoming optical light wave based on the feed-forward signal(s).

5 5. PMD controller device according to claim 1, wherein the distortion analyzer is suitable for analyzing a not polarization scrambled signal.

10 6. PMD controller device according to claim 1, wherein at least one feed-forward signal tap comprises a wavelength demultiplexer unit, and that the distortion analyzer unit is fed with the demultiplexed signals provided by the wavelength demultiplexer unit(s).

15 7. PMD controller device according to claim 1, wherein the dispersion compensation unit comprises a planar light wave circuit with a polarization splitter at the signal input of the PLC, a multitude of 3dB couplers and preferably a polarization combiner at the signal output of the PLC, wherein these components of the PLC are connected in series, with each connection comprising a first waveguide and a second waveguide comprising a tunable phaseshifter.

20 8. PMD controller device according to claim 1, wherein the PMD controller device further comprises a feedback signal tap tapping the equalized optical light wave,  
25 that the adaptation control unit is fed with the feedback signal provided by the feedback signal tap.

30 9. Method of operating a PMD controller device according to claim 8,

wherein

the adaptation control device dithers a number N of parameters smaller than the amount P of tuning parameters in order to optimize the  
5 feedback signal.

- 10 10. Method according to claim 9, wherein the distortion analyzer unit determines the state of polarization of the incoming optical light wave as a function of its frequency, and that the adaptation control device uses the SOP information for controlling the compensation stages.
- 15 11. Method according to claim 10, wherein the determination of operating conditions for the compensation stages is accomplished by reading out a table and/or by calculation, in particular taking into account the experimental or numerical determined relation between signal distortion measured by the distortion analyzer unit and the setting of the distortion compensator unit parameters which is required to improve the signal quality at the compensator unit's output.
- 20 12. Method according to claim 10, wherein the operating conditions of the compensation stages are determined and adjusted continuously.
13. Computer program for performing a method according to claim 9.

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